

Methane recovery and harnessing for energy and chemical uses at coal mine sites



PROJECT DETAILS

Funding Programme:

Research Fund for Coal and Steel (RFCS)

Sub-Programme:

Technical Group Coal 1: Coal mining operation, mine infrastructure and management, unconventional use of coal deposits

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Research project

Project Reference:

754077;

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Project Duration:

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€ 567.334,46

Website:

<https://www.uniovi.es/ME THENERGY/>

PROJECT DESCRIPTION

Methane emissions associated with coal extraction are an environmental and safety risk, but also a potential source of clean energy and chemicals. The scope of the present work is to develop an integrated approach for upgrading this methane in ventilation emissions of working shafts (VAM) as well as those emissions coming from abandoned mines (AMM). This strategy includes the evaluation of concentrations and flow rates in terms of the shaft geological and operational features (working or flooded) and the design of separation processes (based on adsorption processes or membrane technology) and chemical reactors, either for methane combustion (thermal and catalytic reverse flow reactors) or for transforming this methane into useful chemicals, such as methanol, by partial oxidation.

Different strategies are proposed: optimization of the mine operation for providing valuable flow rates and methane concentrations, the development of methane concentration procedures (adsorption, membranes; using nanomaterials with tailored properties); use of advanced reactors and combustion devices (thermal/catalytic reverse flow reactors, membrane reactors, etc.) able to deal with these low concentrations. The final goal of the project is to propose an integrated approach for the harnessing of these emission, from the optimization of VAM and AMM extraction procedures to the development of methane enrichment operations and the fully chemical and/or thermal use of the methane contained in these streams. For this purpose, the project includes in-situ geological studies, experimentation at lab scale, and computer-aided simulation and process optimization.

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